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**Efficient Use of Resources in the Marine Corps Operation and
Maintenance Fund Accounts**

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December 2006

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**EFFICIENT USE OF RESOURCES IN THE MARINE CORPS OPERATION
AND MAINTENANCE FUND ACCOUNT**

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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EFFICIENT USE OF RESOURCES IN MARINE CORPS OPERATION AND MAINTENANCE FUND ACCOUNT

ABSTRACT

A descriptive analysis of resource utilization in the Operations and Maintenance, Marine Corps (O&M, MC) account. This analysis is conducted by examining unliquidated orders and reverted balances in this account. “Reverted balances” is term used to describe resources that are potentially yielded back to the U.S. Treasury at the end of the five year expiration period for any appropriation. For purposes of familiarity and common language the terms “reverted” and “expired” will be used somewhat interchangeably with this understanding.

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I. INTRODUCTION AND BACKGROUND

A. BACKGROUND

During Fiscal Year (FY) 2002, the Department of Defense (DoD) made payments on 11.2 million contractor invoices and 7.3 million travel claims. Recording errors associated with the payment of these invoices and claims totaled \$11.1 billion. It was estimated that unliquidated orders (ULO) accounted for \$7.5 billion and unmatched disbursements (UMD) accounted for \$3.6 billion. Gregory Kutz, Director of Financial Management and Assurance at the United States General Accounting Office (GAO), reported to the House of Representatives, “DoD [Department of Defense] financial management systems and processes continue to be significant impediments to reporting complete and accurate information with respect to budgetary and disbursement activities.”¹ A major outcome of accounting and payment errors is the inefficient use of monetary resources for government purposes.

ULOs represent a major monetary resource issue for the Marine Corps and one that is likely to grow if not addressed in the near future. The likely continuation of the Global War on Terrorism (GWOT) will only increase the volume of transactions and the problems associated with UMDs and ULOs. The consequence of unresolved UMDs and ULOs is that they tie up resources that could otherwise be used for valid operational requirements and/or could potentially lead to violations of fiscal law if not managed properly.

This thesis will examine the efficiency of Marine Corps expenditures as it relates to an accounting transaction cycle with emphasis primarily in the Operations and Maintenance accounts (O&M, MC) by examining Due and Status Files (DASF)

¹ Gregory Kutz, (June 25, 2003). U.S. General Accountability Office, Washington, D.C., *Status of Financial Management Weaknesses and Progress Toward Reform*, GAO-03-931T. p. 9. The entire paragraph references this source.

and ULOs. The O&M, MC account is a funding appropriation approved each year by Congress from which the Marine Corps draws upon for daily operational and maintenance requirements.²

Authorized individuals can obligate and expend resources from this account within official funding restrictions and ceilings. At the end of each fiscal year, this appropriation expires and requisitions have an additional five years to be paid before the appropriation closes and any remaining ULOs are cancelled and funds are returned to the U.S. Treasury.³ Any funds returned to the Treasury represent resources that were, in effect, not utilized and are no longer available for use by the Marine Corps. This thesis will examine the inefficiencies in the flow of transactions and make recommendations on whether they can be reduced or otherwise eliminated.

The flow of transactions within the official accounting records of the Marine Corps generally follows this pattern: Commitment – Obligation – Expense – Liquidation. This process can be related to an accounts payable type of transaction. Without a liquidation (i.e., payment) to finalize the transaction cycle, bills remain unpaid and requisitions remain obligated or “open.” If orders for goods and services are cancelled or become invalid, however, the tracking or document number associated with the obligation remains open and not paid or otherwise cancelled, it is referred to as an ULO. In addition, if a document number is partially liquidated or paid, it is still considered an ULO due to the remaining obligated balance.

The obligation is the key element in all requisitions. Without the obligation, the ULO would never exist. If funds remain unutilized on valid obligations, action must be taken to resolve any discrepancy between the obligation and the payment for that obligation (i.e., liquidation). The focus of this research is on establishing an obligation and completing the transaction cycle with an “appropriate” liquidation. Obligation of

² For specific information related to appropriation law see United States General Accountability Office, (February 2006). *Principles of Federal Appropriations Law. Third Edition.* Material retrieved November 10, 2006 from <http://www.gao.gov/special.pubs>

³ Philip J. Candreva, (January 2005). *Practical Financial Management: A Handbook for the Defense Department Financial Manager*, 6th Edition, 1st Revision, p. 72.

appropriated funds requires the assignment of a document number or simply a tracking mechanism which is assigned in sequential order, by date, during the initiation of requisitions.

At the end of the fiscal year, the O&M appropriation is no longer available for new requirements; however, it can be used to limited extent to cover other expenses that arose during that fiscal year within legal restrictions. Simply put, if there was not a valid need for goods or services in the original fiscal year, the expired funding cannot be used for some requirement that arose subsequent to that fiscal year. Conversely, if a legitimate requirement arose for that fiscal year, but was not originally funded, it could be satisfied with “unobligated” funding. For instance, if fiscal year 2001 has sufficient expired balances, then a legitimate requirement that existed in 2001, but was not originally obligated and/or recorded, could be satisfied with that fiscal year’s expired money, barring any infraction or violation of U. S. fiscal law. However, if the need arose in fiscal year 2002 or later, the 2001 expired money cannot legally be used for that need.⁴

Fund managers must maintain a balance between two reports, the Due and Status File (DASF) and the ULO report. Figure 1-1 depicts the process flow of a transaction. The DASF reflects information entered into financial management systems as a result of entries made by authorized individuals. The ULO is not updated and/or directly affected by the DASF; however, it may be updated by a feeder or sub-system. Feeder systems are those systems that collect data and then provide select information to primary systems. These two reports must be reconciled based on the types of transactions entered on the DASF. Some transactions that are posted to the DASF may not feed through to the ULO report. Alternatively, some transactions that are canceled from the DASF may not cancel obligations on the ULO report. Hence, a constant management approach is required to effectively and efficiently spend existing resources and make appropriate payments.

⁴ United States General Accountability Office, (March 2001). *Principles of Federal Appropriations Law*. Material retrieved November 5, 2006 from <http://www.cfo.doe.gov/budget/gao/Volume%20I.pdf>

PROCESS FLOW OF A REQUISITION

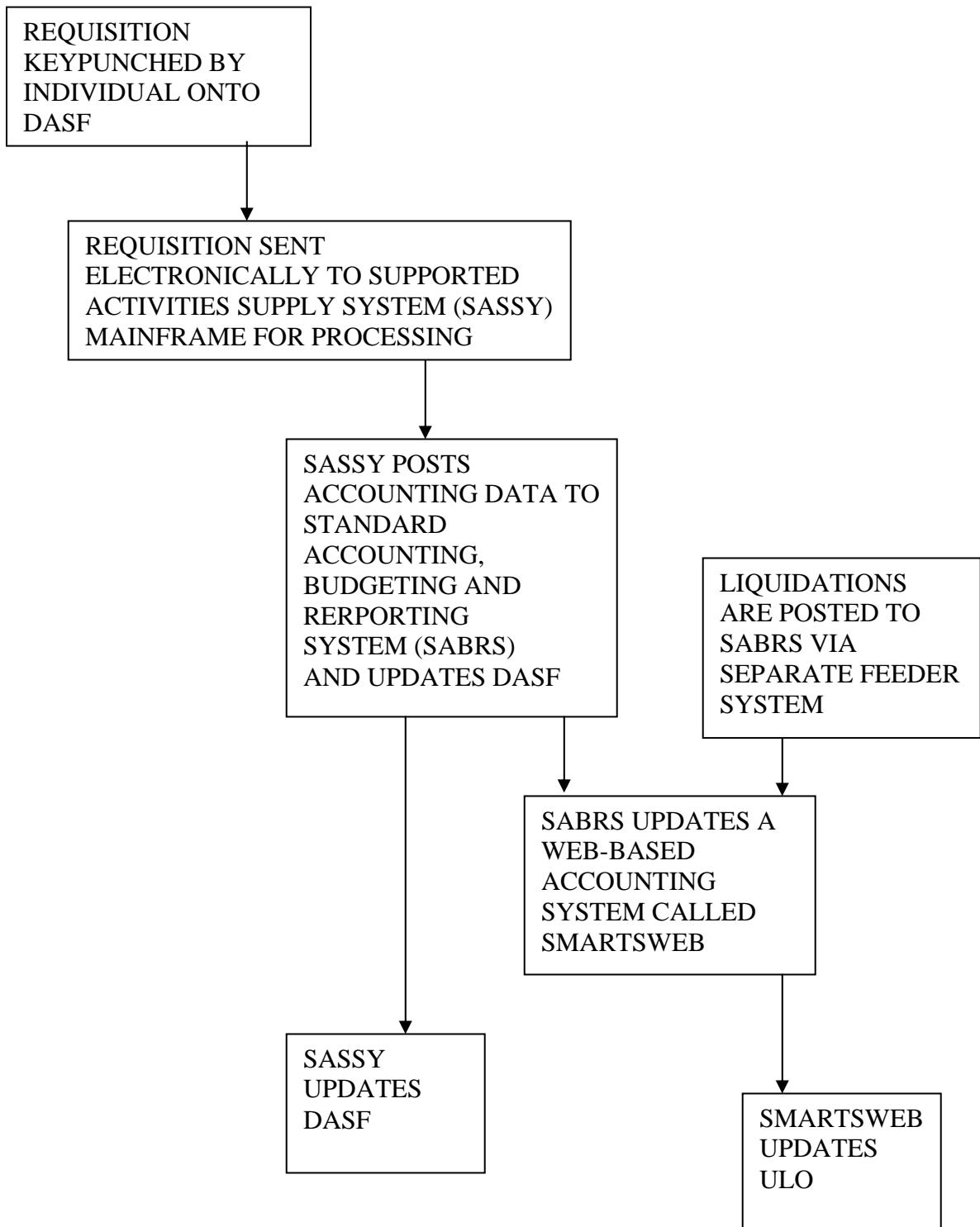


Figure 1-1. Process Flow of a Requisition

Contracts established to non-governmental agencies can also carry ULO obligations for long periods of time. Construction and research projects often take several years to complete. If the estimated costs of these services are lower than actual costs, the requestor could conceivably commit an Anti-Deficiency Act violation. Generally, these situations are controlled by spending limitations and obligation rate performance measurements and thus are not the focus of this thesis. The other extreme is if all funds are not used by the end of the expenditure period, then they are given back to or “reverted” to the original treasury account established by law. Since reverted funds are not necessarily illegal actions or practices in and of themselves, many authorized fund account managers tend to err on the side of caution and use conservative estimates for large projects. This conservatism may be reflected in the obligation amount because the obligation by definition is a legal commitment to procure goods or services on behalf of the government.

B. THE ACCOUNTING PROCESS

According to Marine Corps Order (MCO) P7300.21, The Marine Corps Financial Execution Standard Operating Procedures Manual (MCFE SoP) a requisition goes through a five phase transaction cycle within the Marine Corps Accounting system as shown in Figure 1-2. They are: Initiation, commitment, obligation, expense and liquidation.⁵

PHASES OF THE TRANSACTION CYCLE

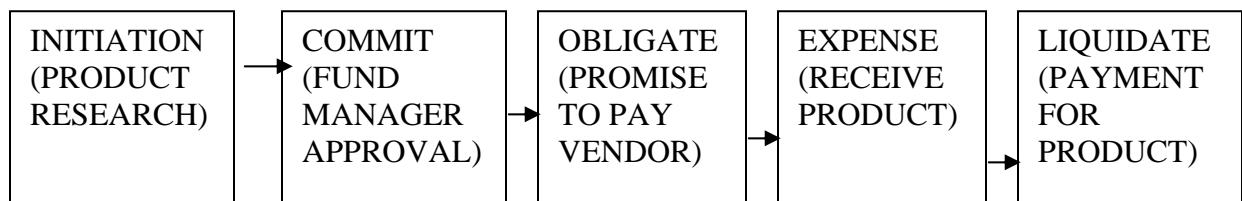


Figure 1-2. Phases of the Transaction Cycle

⁵ MCO P7300.21, (March 29, 2001). *Marine Corps Financial Execution Standard Operating Procedures Manual*, pg. 4-3.

During the initiation phase, research is conducted on the information necessary to create an obligation. After the research is complete, a commitment, or administrative reservation of funds for future procurement, is created. This is the last point in the transaction cycle where an authorized individual can legally cancel or withdraw a requisition for any reason.

An obligation (OBL) is a legal reservation of money to acquire essential resources in order to accomplish the mission. In this case, money has been promised to a vendor in exchange for goods or services. In addition, the obligation commits the government to the transaction and gives reasonable assurance that payment will be made once the product is received.

MCO P7300.21 also defines an obligation as a legally binding agreement between parties for the purchase of goods or services.⁶ In other words, the products do not have to be delivered before the obligation is established. Once an OBL is created, it immediately becomes classified as an ULO because it has not been paid or liquidated. ULOs are orders placed or orders that are believed to be valid that have not been paid by the Defense Finance and Accounting Service (DFAS). The electronic submission of requisitions through the supply system automatically creates an obligation in the Marine Corps accounting system. Contracting and Travel obligations are either manually input or generated by other similar feeder systems.

The fourth step of the transaction cycle is the recording of an expense related to the obligation. An expense is recorded upon the receipt and acceptance of services or materials. “The expense creates the accounts payable amount in the accounting system, and controls the amount billed for transactions.”⁷ This differs from the process used for contracts where major contract objectives, or in some cases the entire contract, must be completed prior to payment, however, the entire amount of the contract is still obligated up front.

The last step of the transaction cycle is the liquidation, also referred to as a disbursement or payment. The liquidation is the physical transfer of funds from the

⁶ MCO P7300.21, (March 29, 2001). *Marine Corps Financial Execution Standard Operating Procedures Manual*, p. A-13.

⁷ Ibid., p. 4-3.

treasury to the vendor for the verified and accepted services or materials. When actual payments can not be properly matched to their original requisitions, the conditions for errors, double payments and/or other problem disbursements occur.

C. UNMATCHED DISBURSEMENTS

Unmatched disbursements are caused by payments with document numbers that do not align; these are erroneous transactions recorded in the accounting system and/or are variances between the payment and obligated amount. In addition, an ULO recorded in the accounting system in the amount of \$21, but for which a payment was made for \$12 results in mismatched amounts. The variance in this example is due to the transposing of figures for the initial obligation but results in \$9 in tied up resources until it is rectified.

Other forms of variances are duplicative posting transactions and misplaced decimals. For example: an obligation exists for \$2000.00 but the payment was processed in the amount of \$20. The accounting system does not use decimals, so when the numbers “2000” are entered, they are posted as \$20. The numbers “200000” have to be entered in order to post the proper payment for this example.

If a payment does not align with the correct document number, the Defense and Accounting Service (DFAS) will process a payment even if the original document number associated with the requisition can not be identified. Accounting system controls may create a new document number and a new obligation that identifies the payment prior to processing the payment. The original document number that was created remains an ULO even though a payment was made by DFAS for that good or service. The lower level unit must identify this ULO as paid and take appropriate action to reconcile the ULO affected by this payment and/or update the accounting system with the proper document number.

Unmatched disbursements can also be an unintended consequence of the Prompt Payment Act. They can occur when the DFAS makes a payment on a requisition and the necessary information for the proper posting of the payment against the correct requisition is missing (i.e., the document number does not match its original form). DFAS must also process the payment in accordance with the Prompt Payment Act (PPA),

which requires federal agencies to pay contracts and purchase orders no earlier than the 23rd day and no later than the 30th day after receipt of goods or services. If the payment is late, interest will accrue at currently prescribed rates. PPA was created on May 21, 1982, and amended on October 17, 1988.⁸⁹ This stipulation can lead to an accelerated effort to reconcile payments, but may also result in a greater number of erroneous transactions within the accounting system.

Quarterly reviews are required by Marine Corps Order (MCO) P7300.21, and the Department of Defense Financial Management Regulation (DoD FMR).¹⁰¹¹ The validation of all ULOs is required three times a year before the periods ending January 31, May 31 and September 30.¹² Ultimately, to avoid reversions, managers must actively manage their fund accounts.

Figure 1-3 below shows the timeline that the O&M appropriation follows. Reversions physically occur at the end of the expired period, normally five years after the obligation period ends, at which time all ULOs are canceled and the remaining funds are returned to the Treasury. Another factor leading to reversions is fallout, which occurs when a ULO is canceled after the obligation period but before the end of the expired period.

⁸ Philip J. Candreva, (January 2005). *Practical Financial Management: A Handbook for the Defense Department Financial Manager*, 6th Edition, 1st Revision, p. 119.

⁹ The Office of the Law Revision Counsel, United States Code, Title 31, Section 6308, dated 30 October 2006. Material retrieved November 3, 2006 from <http://uscode.house.gov>.

¹⁰ MCO P7300.21, (March 29, 2001). *Marine Corps Financial Execution Standard Operating Procedures Manual*.

¹¹ *Department of Defense Financial Management Regulation*, Volume 3, Chapter 8, Sect. 0804.

¹² MCO P7300.21, (March 29, 2001). *Marine Corps Financial Execution Standard Operating Procedures Manual*.

O&M APPROPRIATION TIMELINE

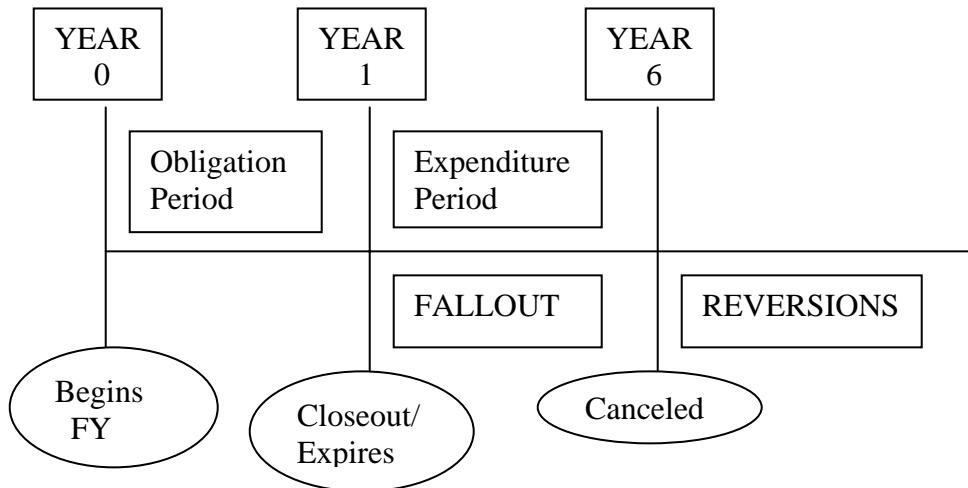


Figure 1-3. O&M Appropriation Timeline

D. THE REQUISITION PROCESS

Most orders are placed through a separate supply ordering system. The orders are sent electronically to the Supported Activities Supply System (SASSY) mainframe once a day before the supply requisition cycle starts. Orders post to a mainframe at the local parts distribution warehouse, known as the SASSY Management Unit (SMU). The requestor will receive a computer generated status. One of three responses will be returned to the requestor: 1) in stock and shipping, 2) not in stock but will ship when material arrives or 3) not managed in this warehouse and sent to the Item Manager (IMA) for a status request. The status from the IMA is generally computer generated depending on whether the item requested is in high demand. The generated status gives a future ship date that will be updated as the status date draws near. If the IMA status is computer generated, it usually means the requested item may not be available for a period of 30 days or longer.

Occasionally, there may be no electronic response from the IMA concerning the receipt of a transaction. The order may not actually make it to the IMA even though a

default computer generated status is returned to the requestor stating that the requisition was sent electronically to the IMA. This results in a “lonesome demand”, and it is the responsibility of the requestor to determine why a requisition does not receive a response from the IMA and take corrective action.

Once the status date issued by the IMA has passed, the IMA must provide a new status date. Sometimes, the IMA fails to update the status and the requisition goes unnoticed by the requestor. If the transaction goes unrecognized into the next fiscal year, it could become fallout unnecessarily. This is a scenario that ultimately produces reversions. Timely updates are critical as we approach the end of the Fiscal Year (FY) when the obligation period is ending and the ability to quickly cancel the order and place another order becomes more difficult.

Management is often cautious not to spend appropriated funds before the IMA cancels the existing requisition. The IMA must verify that the requisition was not shipped before canceling the requisition. A cancellation status will be sent electronically from the IMA in response to a cancellation request. On occasion, the order may not get canceled before the obligation period ends for the current fiscal year, and thereby creates a reverted balance.

To avoid an Anti-Deficiency Act (ADA) violation, the requisition has to be canceled and confirmed by the IMA before the funds can be obligated towards another purchase. In the case where the proper line of accounting was used and the total obligation rate exceeds 100 percent, there may in fact be an ADA violation. An officer or employee of the United States Government may not authorize or incur obligations or expenditures in excess of amounts apportioned by the Office of Management and Budget (OMB).¹³ Fear of violating the ADA often conflicts with efficient utilization or at least planning for the expenditure of likely unliquidated funds. The ADA is a positive control measure that often conflicts with a high level of resource efficiency. These scenarios are representative of many of the issues with reverted fund balances, but certainly do not reflect all the potential situations that could arise.

¹³ The Office of the Law Revision Counsel, United States Code, Title 31, Subtitle II, Chapter 13, Subchapter III, Section 1341 30 October 2006. Material retrieved November 3, 2006 from <http://uscode.house.gov>.

E. ULO VALIDATION

The quarterly review, or ULO validation, is conducted to reduce the potential of fallout. The ULO validation is also designed to improve the utilization of funds and prevent reversions of funds. This process requires a thorough review of both the accounting system and DASF. The ULO must be verified against the receipts on file to ensure the receipt transaction has not been overlooked and to ensure that the ULO is still valid.

Depending on the size of the unit, the number of ULOs could range between 50 and 7000 transactions based upon the type and nature of equipment maintained by the manager's funding. The research time per transaction varies due to complexities and simplicities of each requisition. Most units complete the ULO validation in three to five days and this estimate is based solely on individual experience related to the process. ULOs are checked against all the receipts on file to verify if the product was received and not properly processed. Field training requirements, annual training requirements, base security requirements and annual leave requests can obviously contribute to non-completion or partial completion of ULO validations. Shortages of personnel may reduce the ability of the manager to properly and timely complete a ULO validation.

F. RESEARCH QUESTION

Can the Marine Corps more efficiently utilize its resources by reducing unliquidated orders and reverted balances in the O&MMC account? The purpose of this research is to educate readers on the inefficiencies that may exist between the DASF and ULO reports. This, in turn, will assist in the reduction of payment recording errors, which include ULO variances and UMDs. An analysis of requisitions and contracts must be accomplished in order to understand the factors that lead to payment recording errors.

G. METHODOLOGY OF RESEARCH

This will be accomplished by identifying major problems with DASF management and cross-checking ULOs for validity. A selection of a specific sample of transactions on the DASF will be compared to the ULO report to verify if problems exist

between the two reports. Secondly, research will be conducted into a similar problem example within one privately held company as a success story and then draw on these examples for potential Marine Corps solutions.

H. SCOPE

The scope of this thesis is the O&MMC accounts at Marine Corps Base (MCB) and I Marine Expeditionary Force (IMEF) located at Camp Pendleton, CA. These Commands are part of the Marine Forces Pacific (MARFORPAC) command structure and represent approximately 35 percent of the Marine Corps operating forces and support establishment funding accounts and are typical of the majority of O&M expenditures within the Marine Corps. Therefore they provide a good reflection of most operational accounts within the Marine Corps.

The data was retrieved on October 23, 2006, and November 30, 2006. The data does not fairly represent the ULO reduction percentage totals for the end of each respective fiscal year, with the exception of FY 2006. The data is a snapshot of all fiscal years taken on one specific day. Finally, the Global War on Terrorism (GWOT) expenditures may impact funding trends and behavior in different ways than during “peacetime” operations; these anomalies are not considered in this thesis.

II. THE PROBLEM

A. INTRODUCTION

Unreconciled ULOs and UMDs are essentially tying up resources that could be used more efficiently. A 2003 study by GAO of the Navy's budget for fiscal years 1997-99 found that 65 percent of the \$1.4 billion worth of ULOs was preventable.¹⁴ This represents approximately \$929 million of ULOs and UMDs. Figure 2-1 below depicts a breakdown of the Department of the Navy's (DON) ULOs and UMDs. While the USMC only represents a portion of this total, the ramifications are still pertinent.

Estimate of Navy's Unliquidated Operating Obligations Valued at \$50,000 or More for Fiscal Years 1997-99, as of September 30, 2001

Dollars in millions

Category	Estimated total	Percentage of total
Still needed for original purpose	\$489	35
Not properly accounted for:		
No longer needed for original purpose	452	32
Problem disbursements	147	10
Unresolved errors	330	23
Subtotal not properly accounted for:	929	65
Total	\$1,419^a	100

Source: DOD.

Note: GAO analysis of DOD data.

^a Amounts do not add to total due to rounding.

Figure 2-1. Estimate of Navy's ULOs for Fiscal Years 1997-99
(From: GAO Report #GAO-03-275)

Separate supply and disbursement systems feed information into the accounting system (refer to Figure 1-1 in Chapter I). The two systems are designed to match requisitions with payments; however, they frequently are unable to complete transactions per the accounting transaction cycle. The problems with the feeder systems are often

¹⁴ Government Accountability Officer, January 2003. *Improved reviews needed to Ensure Better Management of Obligated Funds.* GAO-03-275.

created by human input errors which lead to computer posting errors. The resultant interface with feeder systems combined with the interaction of the human element creates problem transactions that require attention.

An ULO validation will correct the issues surrounding unreconciled ULOs. Managers are required to perform the validations in accordance with DoD policy and MCO P7300.21. The transaction cycle is often interrupted because of the fund manager's inability to properly monitor and correct these transactions.¹⁵

B. PROBLEM TRANSACTIONS ON THE DASF AND THE ULO

Every DASF requisition generates two transactions upon the submission of requisitions to the supply mainframe. One transaction is posted to the DASF (ordering system) and one to the ULO report (accounting system), which are processed simultaneously. Some common types of DASF transactions that create invalid ULOs are lonesome demands and cancellations. Double obligations and UMDs are types of ULO problem transactions that also require attention.

A lonesome demand is a requisition submitted by a requestor but not received by the IMA. This transaction is generally an example of a computer processing problem. Although the DASF transaction did not post properly, it does not preclude the accounting transaction from posting an OBL to the ULO report. DASF transactions of this type are the simplest to identify and correct and can be resolved in a short period of time unless DASF management inefficiencies exist. Figure 2-2 displays an example of a lonesome demand on a DASF.

¹⁵ Government Accountability Officer, January 2003. *Improved reviews needed to Ensure Better Management of Obligated Funds.* GAO-03-275. p. 9.

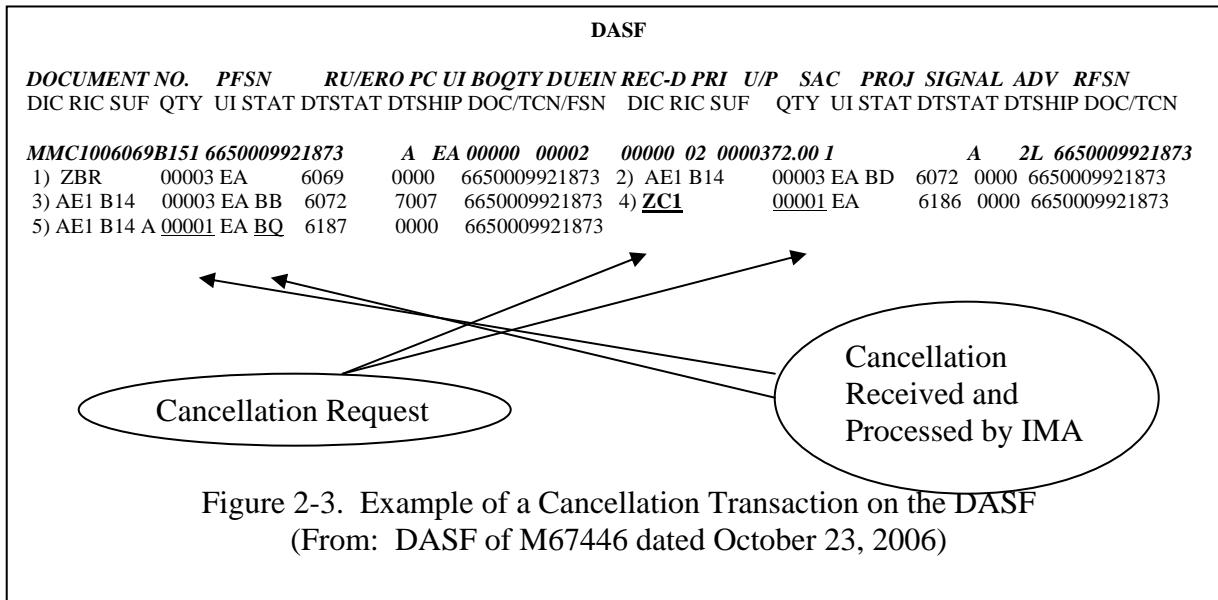
DASF																	
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MMC1006074B133	5315014086009		A	EA	00000	00027	00000	02	0000014.27 1		A	2L	5315014086009				
ZBR	00027	EA		6074	00000	5315014086009											
AE1	SMS	00027	EA	BB	6188	6304	5315014086009				AE1	SMS	00027	EA	BD	6075	00000 5315014086009

Examples of Lonesome Demands (NO status from IMA).

Example of a transaction that was received by IMA.

Figure 2-2. Example of a Lonesome Demand and a Normal Transaction on the DASF
(From: DASF of M67446 dated October 23, 2006)

Occasionally, cancellation transactions from the DASF do not process properly and leave an OBL on the ULO report. A cancellation transaction is designed to reduce the quantity of the original transaction and ultimately adjust the ULO dollar value to zero; the cancellation should delete the original transaction and remove the ULO completely from the report. This type of transaction is a little more difficult to find and timely to correct than a lonesome demand because the DASF transaction may not be reflected on the DASF report. If an ULO exists without a supporting DASF requisition or contract request, it is an invalid ULO and thus should be de-obligated. Figure 2-3 shows an order for three items and a subsequent cancellation of one of those three items. Through strict adherence to ULO validation policy and aggressive DASF and ULO management, most of these problem transactions can be alleviated.



On the other side of the coin, contracts need to have the CMT, OBL, EXP and LIQ transaction entered manually into the accounting system. Correcting transactions are adjustments to either one or more of the following transactions: CMT, OBL, EXP or LIQ amounts. Not only are the transactions manually entered and adjusted, but the transaction cycle involves three different individuals from three different locations (i.e., it is decentralized). Sometimes the decentralization causes the commitment and obligation phases to be duplicated.

The manager is responsible for the commitment and expense phase of the contracting transaction cycle. The contracting office is responsible for the obligation phase. DFAS is responsible for processing the liquidation upon receipt of information from the fund manager. Occasionally, the manager and the contracting office both process a CMT and/or OBL and create a double OBL. The person ultimately responsible for the management of the funds for the contract is the fund manager, not the contracting office or the SMU.

Duplicate obligations and transposed numbers are other contributors to inaccurate amounts on the ULO report. Double posted transactions are simple to identify and correct. The CMT and OBL are always the same amount, so when these two numbers are

different it should garner attention. Looking at the difference in these numbers, you can accurately predict what caused the difference. See Figure 2-4 below, for some examples of problem transactions on the ULO report.

EXAMPLE OF THE UNLIQUIDATED ORDERS REPORT

Document Number	CMT	OBL	EXP	LIQ	Explanation of Problem Transactions on the ULO
M0068106SUSUJAN	65,240.00	0.00	0.00	0.00	Example of a contract request sent to Contracting Office for approval and selection of vendor
M0068106TOE6323	13,267.00	1,326.70	1,326.70	46.00	Example of typo between CMT and OBL
M3361006SSFS234	3,814.00	3,120.00	3,120.00	0.00	Example of Contracting Office negotiating cheaper contract than initially quoted. Receipt of material, so DFAS needs to process LIQ. Fund manager needs to adjust CMT
M0068106SSDD001	135,000.00	67,500.00	62,440.03	62,440.03	Example of a double commitment

Figure 2-4. Examples of Transactions on ULO Report

UMDs are created when a disbursing activity receives a bill and has made a payment but not all the necessary accounting data or fund activity information is present. No ability exists to match the bill to an existing ULO.

Chapter III will examine a private company example for principles and actions that have successfully led to eliminating the problems outlined above.

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III. PHASE MATRIX MODEL

A. INTRODUCTION

The Marine Corps could benefit by learning how firms in the private sector operate. In this section the thesis will describe how one DoD supplier, Phase Matrix, manages its inventory requirements and accounting system, in order to meet customer demand and remain profitable. Then this thesis will note the areas, where improvements could be made in the accounting system using a set of private sector methods/principles to reduce the number of ULOs and UMDs.

B. PHASE MATRIX THE COMPANY

Phase Matrix, Inc. is in the microwave and radio frequency equipment industry.¹⁶ They produce microwave and radio frequency testing equipment. Phase Matrix uses the MRP system and receives products from major corporations like Xilinx and Agilent.

C. DEMAND DIFFERENCES FROM DOD

It should be noted that there are significant differences between private corporations and the military organization, for instance profit motivated versus not for profit. These differences are important, yet the similarities of the business model are pertinent enough that the Marine Corps could benefit by adopting some of the private sector practices.

Phase Matrix's ordering system is based upon dependent demand and a Material Requirements Planning (MRP) system. Dependent demand is characterized by end products that are requested by customers and thus the component parts that make up that end product are dependent on markets and availability of supplies, etc. Essentially, any producer of an assembled product will have dependent demand. For example, the demand for two radio frequency knobs, one antenna, one radio casing and twenty-five

¹⁶ Note: the above information was derived from Phase Matrix's company website. Company Profile, About Phase Matrix, Inc., June 5, 2006. http://70.249.104.103/PM_Web/cmpnypro.html

screws are based on the demand for one radio. Their demand requirements for the components can be accurately calculated by looking at the demand for the product.¹⁷

The Marine Corps uses a hybrid dependent/independent demand model. The quantities demanded are not entirely dependent upon other products.¹⁸ However, demand is forecasted based upon the history of usage, for instance in maintenance performed, manager's experience, or other statistical data which are roughly combined to develop a Re-order point (ROP). Inventory levels, high/low demand parts and other factors affect the re-order point; however, this model is roughly similar to the Phase Matrix model. Figure 3-1 lists the primary differences between dependent and independent demand. Figure 3-2 lists the difference between MRP and Fixed Order Size ordering systems.¹⁹

INDEPENDENT VERSUS DEPENDENT DEMAND

Independent Demand

Probabilistic/able to be forecasted
Randomly-generated
Continuous

Dependent Demand

Deterministic/able to be calculated
Parent-generated/derived
Discrete / lumpy

**Figure 3-1. Independent vs. Dependent Demand (After:
<http://www.ou.edu/class/tersine/scm4023/slides/SCM4023ch08.ppt>)**

¹⁷ Russ Foster, Phase Matrix, Inc., Director of Operations. Personal Interview dated November 29, 2006.

¹⁸Richard J. Tersine PhD. (2004). *Principles of Inventory and Materials Management*. Material retrieved November 29, 2006 from <http://www.ou.edu/class/tersine/scm4023/slides/SCM4023ch08.ppt>

¹⁹ Ibid., Figure 3-1 and 3-2 were retrieved November 29, 2006 from <http://www.ou.edu/class/tersine/scm4023/slides/SCM4023ch08.ppt>.

COMPARISON OF FIXED ORDER SIZE AND MRP SYSTEMS

<u>Fixed Order Size System (EOQ / EPQ)</u>	<u>MRP System</u>
Part oriented (every item)	Product / component oriented
Replenish supply	Actual requirements
Independent demand	Dependent (derived) demand
Continuous item demand	Discrete / lumpy item demand
Random demand pattern	Known lumpy demand pattern
Continuous lead time demand	No lead time demand
Reorder point ordering signal	Time-phased ordering signal
Historic demand base	Future production base
Forecast all items	Forecast master schedule items
Quantity-based system	Quantity and time-based system
Safety stock for all items	Safety stock for end items
End items / spare parts	Raw materials /work-in-process
Just-in-case	Just-in-time

Figure 3-2. Comparison of Fixed Order Size and MRP Systems (From: <http://www.ou.edu/class/tersine/scm4023/slides/SCM4023ch08.ppt>)

In addition to the differences in the types of demand and ordering systems, Phase Matrix has also established key fiscal objectives for its managers which ensure the company remains a profitable and successful competitor in its industry.

D. MODEL PROCESS

Phase Matrix aggressively manages outstanding orders with a MRP system. There are two individuals responsible for the ordering, tracking and follow-up on outstanding orders. These tasks are completed once a week and encompass monitoring over 5000 transactions annually in addition to other tasks they are assigned. Phase Matrix balances the following four critical objectives while managing their inventories:

1. Quality
2. Costs
3. Delivery
4. Inventory Levels

The training of personnel who handle the day-to-day ordering is vitally important to the success of any system. Our personnel have a working knowledge of the system and understand that accurate data is essential for the ordering process to operate efficiently. We have a comprehensive ordering system that uses the computerized MRP process. We plug in the demand for the products ordered by our customers and the MRP program checks our inventory level and computes how much of every part we will need and the lead time it takes to receive the product. Precise calculations are necessary for us to meet the demand of our customers, and ultimately for us to reduce our costs by being efficient in our processes. Phase Matrix is very good at managing their inventories.²⁰

The company attributes the following items as the main reasons for this success:

1. Modern comprehensive management and tracking systems
2. Insuring the accuracy of data input and maintained
3. Proper training for all employees as well as low personnel turnover
4. Continuous follow-up on exception items (items over-due)
5. Setting clear fiscal objectives for managers

These are the qualities of the effective model used by Phase Matrix because of their need for hundreds of specific parts at certain key points in time.

E. PHASE MATRIX CONTRACTING

Managing uncertainty with contracts is one way of handling risks. Phase Matrix uses contracts for complex parts and hard to find items. They also use contracts for parts that require long lead times. These contracts reduce the risks of not obtaining critical parts and avoid interferences with the production cycle.

The major parts that are cost drivers to one of their products are the main circuit board, front panel and power supply. The main circuit board is pieced together as a kit at Phase Matrix and then subcontracted out to have a few hundred pieces assembled as one unit. The front panel is another major cost driver because of a few expensive items that contribute a majority of the costs. Finally, the power supply is another cost driver of the end product. Contracts keep prices under control and maintain a steady flow of parts.

The process of establishing a contract is the same for any product. A call is made to a particular vendor upon verification that the terms of the contract can be met, it is

²⁰ George Clark, Phase Matrix, Inc. Chief Financial Officer. Personal interview conducted on November 29, 2006.

approved. Next, a purchase order with the terms and conditions is drafted and signed by both parties. When the contracted items are received, the bill is appropriately paid. This is a fairly simple process for strategically essential items and a process that is also performed within Marine Corps units.

F. INVENTORY PROBLEMS AFFECTING ACCOUNTING CYCLE

Phase Matrix has their part suppliers hold a majority of the non-essential inventory. In emergency cases, Phase Matrix holds a high safety stock for the complex and hard to find items. They also try to maintain two or three vendors for the regular parts, but that is not always true for the essential, hard to find items. With several vendors, it strategically gives Phase Matrix the upper hand when one of the suppliers tries to raise prices or can not meet product delivery deadlines. This process and/or strategy is also followed by Marine Corps logistical bases for ordering and procuring various parts which are ultimately forwarded to operating units via the supply system via the SMU mentioned earlier.

Holding costs are minimal because of the MRP system and the use of a distributor as a parts supplier of common parts. Contracting costs are minimal because of the use of a standard format contract that does not require extensive man hours to prepare.

G. CONTRACT UNCERTAINTY

Contract uncertainty is the likelihood that a contractor will not be able to meet the terms of the contract. The inability to precisely estimate the total cost of large contracts is another form of contract uncertainty. The ability to deal with this uncertainty is a generally considered a management issue or approach. Communication with the contractor is essential to good contract management.

Phase Matrix handles contract uncertainty by communicating daily with their contractors. Although their resources do not have the same time/spending restrictions that the Marine Corps appropriations are faced with, contract uncertainty has similar ramifications with regard to efficiently managing resources.

H. MARINE CORPS ORDERING SYSTEM VERSUS PHASE MATRIX

There are significant departure points from the Phase Matrix model in the following manner:

1. Several systems vice one comprehensive system.

Separate systems make it difficult to compare relevant data. Furthermore, separate systems often contain data that is transcribed in different formats and thus could lead to duplicate or erroneous entries. The sheer volume of transactions created by numerous sub-systems increases the requirement for maintenance and review.

2. Lower level of attention given to training personnel and a higher personnel turnover rate versus high level of training and lower turnover.

Every system is subject to human interaction and thus error, the best way to reduce human error is generally through training and minimizing change. This is more important for the Marine Corps because of its high personnel turnover rate. Turnover rates are one of the major differences between the Marine Corps and the private industry. The Marine Corps relocates personnel, on average, every three years where turnover rates for private industry personnel are dramatically lower.

3. Performance and objectives are largely related to obligation rates and fiscal laws vice a focus on key success indicators which bring value to the organization, and motivation to the workforce.

Another difference between the Marine Corps and private industry are the objectives for fund managers. Private industry profits from efficiency produced during management activities and the managers are financially rewarded for such successes. Marine Corps fund managers do not receive financial rewards for efficiently managing appropriated funds. In fact, they are encouraged to spend the majority of their efforts on inefficient procedures/actions that do not always align with organizational goals and objectives. The pressure to spend money also results in some inefficiency. Fiscal year-end spending gives rise to large amounts of ULOs. This type of spending behavior increases year end transaction volume and potentially leads to reverted balances due to the larger propensity for “fallout”. The large number of transactions makes it difficult to manage the ULO report.

Chapter IV will outline and review data extracted for three fiscal years of both Marine Corps supply orders and contracts established at the institutions outlined in Chapter I. This review will solidify the major areas of concern and provide a basis for recommendations for improvement in Chapter V.

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IV. DATA ANALYSIS

A. THE SUPPLY SYSTEM

As reflected in Figure 4-1 below, the ULOs within I MEF for 2004 reflect 0.3 percent of the total authorization. In FY 2005 the ULOs account for 2.7 percent of the total budget. The percentage increases to 14.6 percent in FY 2006. At the same time, the FY 2006 total authorization decreased 30.9 percent or \$35 million over each year.

SUPPLY SYSTEM TOTALS

	SUPPLY SYSTEM		
	2004	2005	2006
TOTAL AUTHORIZATION	\$108,562,761	\$116,588,955	\$80,585,260
ULO	\$379,808	\$3,116,610	\$11,766,373
GOOD STATUS	\$23,311	\$303,500	\$8,973,558
BAD STATUS	\$356,497	\$2,826,498	\$3,186,383
LONESOME DEMAND	\$0	\$13,388	\$393,568

Figure 4-1. Supply System Totals

The majority of ULOs appeared to have “good status” or in other words would reasonably lead to receipt and payment of goods thus properly fulfilling the accounting transaction cycle for these items. However, over \$3M of requisitions or 4% of the total funding authority in the supply system indicated “bad status” which implies a likely potential for reverted funding. Once the fiscal year ends, these resources can no longer be applied to legitimate organizational requirements. Hence, an inefficient use of available funding. Furthermore, \$.4M or less than half a percent indicated no status or “lonesome demands” which can also be a good indicator of potential reverted funding.

It did appear that after a period of three to five years (corresponding to the five year expiration period of the O&M funding account) that these types of ULOs had been significantly reduced and/or eliminated. Notwithstanding, these resources were tied up during that reconciliation timeframe.

B. CONTRACTS

The data in Figure 4-2 indicates that contract ULOs follow a similar pattern for reduction as do supply transactions. However, they total a larger volume and proportion of the total funding authority. They do contain a unique quality in that they are even more dependent on local vendors and their ability to accommodate government requests. For the most part, contracts appeared to be manageable; however, there were several exception items/accounts that highlighted problems.

Figure 4-2 also shows two accounts which carry the majority of the ULO totals (Public Works and Environmental sections). There was further investigation to determine why the majority of the ULO totals were confined to two sections and personal interviews were conducted to tease out any trends.

FUND ACTIVITY PERCENTAGES OF TOTAL ULO

Fund Manager	FY2002	% of Total ULO	FY 2003	% of Total ULO	FY 2004	% of Total ULO	FY 2005	% of Total ULO
SWRFT	17,689	1.1%	15,821	1.2%	0	0	0	0
MEO	3,955	0.2%	150,854	11.8%	134,369	2.4%	0	0
FAC Sustainment	284,181	17.2%	685,844	53.6%	55,388	1.0%	1,360,364	6.7%
Public Works	150,518	9.1%	239,722	18.7%	1,944,735	35.0%	9,331,149	46.2%
Environmental	1,090,818	66.2%	59,801	4.7%	1,464,759	26.4%	8,758,407	43.4%
CISD	58,276	3.5%	104,245	8.1%	0	0	0	0
MWTC	43,051	2.6%	20,739	1.6%	14,283	0.3%	0	0
Base Housing	0	0	2,924	0.2%	0	0	0	0
FAC Energy Conservation	0	0	0	0	1,923,830	34.6%	99,642	0.5%

Figure 4-2. Fund Activity Percentages of Total ULO

An interview with Mr. Ryland Hairston, the Fund Manager for the Environmental account on Camp Pendleton, revealed that there are many factors that can result in ULOs.²¹ Extraordinary circumstances, a contractor stopping work on contracts and contractor defaults are reasons that could cause reversions in the environmental account.

²¹ Ryland Hairston. Fund Manager of Environmental account at Marine Corps Base, Camp Pendleton, California. Personal interview conducted August 24, 2006.

An example of an extraordinary circumstance would be a project that includes a seasonality survey about rainfall or pest surveys on the types of pest on federal government land. If there is not a certain amount of rain, the survey can not be completed in a timely fashion and may be delayed until the next fiscal year. The same applies for rodent studies, if the rodents can only be studied under certain environmental conditions and if those conditions do not exist the study has to be delayed until a future date. In either instance an ULO would result and remain open until conditions are such that the work can be completed.

Sometimes, estimates on contracts are not exact and require further funding to complete. Contractors stop working until funding is available for their within scope modifications. Within scope modifications are changes to the scope of a project that expand the contract price, but do not create a new task, unless the new task is essential to the completion of the project. These types of modifications have to be funded with money from the originating fiscal year funds. Contractors often stop working because of the fear of not receiving payment due to the fact that the appropriation does not have enough money to fund the within scope changes.

Contractor default is another reason for ULOs. If a contractor defaults, then a second contractor has to be contracted to finish the original task, which ultimately extends the ULO. This is a relatively infrequent occurrence, but can have sizeable financial impacts. There were three defaults within the past five years.²² One contractor was selected to do three separate jobs in different fiscal years and that contractor eventually went bankrupt. The funds of one of the established contracts was close to being reverted due to the end of the expenditure period and the limited time available to finish the tasks related to the contract.

Hairston agrees that fund managers must manage contracts more efficiently in order to avoid or reduce problems associated with contract uncertainty and reverted balances.

²² Ryland Hairston. Fund Manager of Environmental account at Marine Corps Base, Camp Pendleton, California. Personal interview conducted August 24, 2006.

C. CONTRACTS VERSUS THE SUPPLY SYSTEM

As outlined in Figure 4-3, contracts have a higher total value of ULOs than the DASF. Due to large ULO balances and contract uncertainty, these amounts show higher reverted balances than the DASF ULOs. Also, contracts give potential for higher reverted balances because the funds are often legally obligated for longer periods of time when compared to the Supply transactions. Contract ULOs make up between 71 and 80 percent of the total ULOs in each fiscal year respectively. Regardless, contracts and supply transactions both contribute to the overall ULO and should be dealt with accordingly. Total funding authority for MCB CAMPEN was unknown; therefore, the focus of analysis was on total dollar value of ULOs.

ULO DIFFERENCES BETWEEN CONTRACTS AND THE DASF

	CONTRACTS			SUPPLY SYSTEM		
	2004	2005	2006	2004	2005	2006
TOTAL AUTHORIZED				\$108.6M	\$116.6M	\$80.6M
ULO TOTAL	\$5.6M	\$20.5M	\$65.2M	\$0.4M	\$3.1M	\$11.8M
GOOD STATUS				\$0.02M	\$0.3M	\$9.0M
BAD STATUS				\$0.4M	\$2.8M	\$3.2M
LONESOME				\$0M	\$0.01M	\$0.4M

Figure 4-3. ULO Differences between Contracts and the DASF

Chapter V outlines conclusions of this thesis given this data and then makes several feasible recommendations that begin to address the problem areas associated with resolving ULOs and more efficiently utilizing resources.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

- 1). At the end of FY 2006, ULOs within I MEF accounted for less than five percent of total funding. FY 2004 ULOs were completely zeroed out indicating that there were no longer any “reverted balances” in these accounts. The most significant reduction of ULO balances occurred within the first expired year.**
- 2). The majority of ULOs could be relatively predetermined by focusing on either “bad status” or “lonesome demand” items. Many of the transactions that resulted in “fallout” occurred from requisitions that were made during the last 30 days of the fiscal year.**
- 3). Contract ULOs represented 71-80 percent of the total ULOs at the end of fiscal year 2006. Contracts at Marine Corps Base, Camp Pendleton clearly contained the majority of funding obligations that remained unresolved at year end.**
- 4). Eighty-four percent of contract ULOs were tied up in two local fund accounts. One contract was dependent upon good environmental conditions that have not occurred. The other contracts were from a contractor in default of contractual agreement. The contractor could not meet the terms of the contract. This was not realized until several years after the contract was established because of the lack of adequate contract management. The contracts relating to the default were mismanaged and will become a reverted balance if otherwise not redesignated. Most contracts for small construction projects do not begin for one to three years after the contract is finalized, which also contributed to the length of time a contract remains unliquidated.**
- 5). Although the majority of ULOs were resolved during the five year expiration period, a large portion of those ULOs were resolved within one year or less. This suggests that either: Changes should be made in the procedures requiring ULO validations and/or regulations pertaining to resolution of ULO balances, or that a**

more centered approach to training, education, and management of ULOs would lead to more efficient utilization of financial resources in the Marine Corps O&M accounts.

B. RECOMMENDATIONS

1. The Marine Corps should work towards a more comprehensive single ordering and accounting system in order to reduce redundancies, excess volume of transactions or the potential for the occurrence of mis-matched transactions. Similar to the Phase Matrix model explained in Chapter III.

2. Limit personnel turnover to the extent possible and increase the nature and content of training that relates directly to the resolution of “reverted balances” and “unliquidated orders”. This applies to both supply and contract related accounts.

3. Improve the management of fund accounts and associated problem areas like reverted balances and unliquidated orders by setting clear fiscal objectives at the unit level which address both fiscal laws and better performance measurements. This may alleviate the emphasis on “year end spending to make obligation performance goals” by challenging personnel/units to improve their buying practices and focus on what matters to the organization in resource utilization versus becoming preoccupied with spending available resources.

4. Efforts should be proportionally more directed toward contract reconciliation vice supply transactions. This would improve the effort given to resolving contract issues versus spending inordinate amount of time on lower dollar value procurements.

5. Finally, current efforts like ULO validations should continue in effect, but also be improved by simplifying the steps and/focus of the validations. It appeared that for the most part these actions met with success in terms of eliminating ULOs in both supply and contract accounts, however, the timeframe in which they were reduced/eliminated could be cut down significantly by looking at value added approaches. For instance, an all out attack on reconciling accounts at the end of the fiscal year during

traditional “down periods of time” could result in the most effective reconciliation and reduce the need for revisiting the same validation over and again.

C. RECOMMENDATIONS FOR FURTHER STUDY

- 1). Examine the effects of personnel turnover on various Marine Corps units (i.e., West coast units versus overseas units which traditionally have higher turnover).
- 2). Complete a review of other Marine Corps appropriation accounts in regard to ULO balances and/or efficient resource utilization.
- 3). Develop means and ways for addressing contract ULOs mentioned in this thesis. For example, what would the effects of managing contract uncertainty be if funding was awarded on the basis of performance in existing similar in scope work.

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